Claims

1. A method for downscaling a digital matrix image, using a selected ratio R, in which the matrix image includes a large number of lines, each line including a large number of pixels, so that the intensity values of the pixels form the matrix, and in which the output matrix pixels formed by scaling correspond to sub-groups of the original matrix, from the intensity values of the pixels of which an average is calculated for each pixel of the output matrix,
characterized in that three integers X, Y, and Z are selected in such a way that
- the scaling ratio R corresponds approximately to the equation Y/(Z*X), in which Y < Z, and
- scaling is performed in two stages, of which
- in the first stage, the matrix is scaled using the ratio 1/X, thus creating the pixels of an intermediate matrix and, in the second stage, the each pixel of the intermediate matrix is scaled using the ratio Y/Z.

2. A method according to Claim 1, characterized in that the second scaling is performed, after the first scaling, to the pixel group calculated for the intermediate matrix, without completing the calculation of the entire intermediate matrix.

3. A method according to Claim 1 or 2, characterized in that, in order to minimize the calculation process, in the first scaling the integer X is selected to be as great as possible, according to the integers maximums selected for Y and Z and the selected total ratio R.

4. A method according to Claim 1 or 2, characterized in that, in order to minimize the amount of memory required in the second scaling, in the first scaling the integer X is selected to be as great as possible as the power of two.

5. A method according to Claim 1 or 2, characterized in that, in order to optimize the image quality, the integers X, Y, and Z are set in such a way that 1/X is approximately Y/Z.

6. An apparatus for downscaling a digital matrix image by a selected ratio R, in which the apparatus includes a first memory area for recording the matrix image to be scaled, a second memory area for processing, and a third memory area for the output image matrix, a central unit (CPU) for performing processing, and in which the matrix image includes a large number are lines, each line including a large number of pixels, so that the intensity values of the pixels form the matrix, and i which the pixels of the output matrix formed by scaling correspond to the sub-groups of the original matrix, from the intensity values of the pixels of which an average is calculated for each pixel of the output matrix, characterized in that the apparatus is arranged to process the matrix image in two stages, in the first stage of which the matrix is scaled using the ratio 1/X, thus creating the pixels of the intermediate matrix for the second memory area, and in the second stage each pixel of the intermediate matrix is scaled using the ratio Y/Z, and that the said integers X, Y, and Z meet the conditions:

- the scaling ratio R corresponds approximately to the equation Y/(Z*X), and
- Y < Z.

7. An apparatus according to Claim 6, characterized in that the apparatus in integrated in connection with the image sensor of a camera.

8. An apparatus according to Claim 7 and incorporating a host system, characterized in that the coarse scaler is integrated in connection with the image sensor of a camera and the fine scaler is integrated in the host system.

9. An apparatus according to Claims 6 or 7, characterized in that the apparatus includes a scaler unit, in which there are separate processors (CPUs) for the coarse and fine scalers.

10. An apparatus according to any of Claims 6 - 9, characterized in that the apparatus includes a memory for the scaling function of at most 4 image-sensor lines for each colour component.

11. An apparatus according to any of Claims 6 - 10, characterized in that the apparatus is fitted to a mobile station.